

Title: Soak up the Sun

Subject: Science

Skills: Observing, recording, drawing conclusions,

Grade Level: 3-6

Length of Lesson: Set up and background 30 minutes. Observations-over a few days.

Overview: Students will build a model to demonstrate how different surfaces of the Earth absorb or reflect heat from the sun. This in turn changes the air pressure-an indicator of what kind of weather we'll have.

Background information: Dark or heavy areas of the Earth, such as soil, absorb heat from the sun. Light colors or softer materials, such as water or grass, reflect the heat from the sun back into the atmosphere. Where heat is absorbed, the nearby air is heated and the warm air rises, thereby creating low air pressure. There is less air "pressing" down on the ground if the air is rising, so it is "low pressure". Where heat is reflected, you get cooler temperatures. The cooler temperatures mean high air pressure, (because the air falls as it cools it is "pressing" down on the ground more). As the warm air rises, cooler air moves in to fill its space, thereby creating wind. These changes in air pressure and wind are what create the different types of weather.

Materials: per group

2 pans

Soil

Water

2 thermometers

Teaching the Lesson:

1. Ask students if they have ever walked barefoot across a black driveway in the summer. What happens to their feet? Then ask them if they ever walked across a white sidewalk the same way. Why don't their feet burn as much? Explain to students that dark colors absorb heat, and hang on to it, just like a sponge absorbs water and hangs on to it. The lighter colors reflect it, so they don't get as hot.
2. Explain to students that these areas that absorb heat cause the air to be warmer and rise up. The cooler areas cause the air to be cooler and sink. Have students imagine this happening over a very large area. When large areas (hundreds of miles) have air warm up and rise, or cool off and fall, the air pressure for the area is changed. This change in air pressure gives us nice or stormy weather.
3. Tell students they are going to see what kinds of surfaces absorb heat, and what kind reflect heat.

4. Have the groups fill one pan with soil, and the other with water. Place a thermometer into each pan and place in an area that gets full sun. This experiment should either be done in a very sunny window, or outdoors during warm weather.
5. Have students record the temperature in both pans both first thing in the morning and again at the end of the day
6. Have students record the temperatures for both pans, as well as the time the temperatures were taken. They should do this for several days. (Note that results will be affected by cloudy days).
7. What do they observe about the two surfaces and their exposure to prolonged heat from the sun? Which surface held onto the heat longer?

Evaluation:

Students should complete the Soak up the Sun worksheet

Extension:

This activity can be extended to show the effects the ground temperature has on the air above it.

*You will need a hot plate, frying pan, bowl of ice, aluminum foil and a thin strip of tissue.

*Make a cone or simple tent out of aluminum foil and place over the frying pan, pressing the edges securely around the perimeter of the pan.

*Cut a one inch hole in the top of the cone.

*Place the pan on a hot plate and heat the pan.

*While the pan is heating, place the bowl of ice on the table by the hot plate.

*After about a minute, shut off the heat under the pan. This now represents a dark surface that has been heated by the sun.

*Hold the strip of tissue paper over the hole in the aluminum foil, and observe how it gently moves from the warm air current.

*Next hold the tissue over the ice and notice how it doesn't move.

Hot air rises when it is heated by the soil absorbing the sun's heat. This creates a moving air current. The tissue moved when held over the hot pan demonstrating the rising air current. The tissue didn't move when over the ice, because the air was cool, and not rising.

Name _____



Soak up the Sun

Complete the following table as you observe the temperatures in the pan of soil and the pan of water.

	a.m. water temperature	p.m. water temperature	Water temperature change	a.m. soil temperature	p.m. soil temperature	Soil Temperature Change
Day 1						
Day 2						
Day 3						
Day 4						
Day 5						

1. How did the temperature of each pan change from morning to afternoon? _____

2. Which pan had a greater temperature change from afternoon to the morning?

3. Which pan held onto the heat longer? Why do you think this is so?

